(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 August 2001 (09.08.2001)

PCT

(10) International Publication Number
WO 01/58085 A1

(51) International Patent Classification[7]: H04L 12/18, 12/28, H04Q 7/00, H04L 29/06

(21) International Application Number: PCT/SE01/00115

(22) International Filing Date: 23 January 2001 (23.01.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/494,880 31 January 2000 (31.01.2000) US

(71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).

(72) Inventors: WESTBERG, Lars; Långtora Grän, S-745 96 Enköping (SE). GALYAS, Peter; Slottsvägen 31, S-183 52 Täby (SE). LINDÉN, Lars; Viaduktgatan 17, S-280 23 Hästveda (SE). MUSIKKA, Niilo; Nockebyvägen 59, S-167 75 Bromma (SE).

(74) Agent: MAGNUSSON, Monica; Ericsson Radio Systems AB, Patent Unit Radio Access, S-164 80 Stockholm (SE).

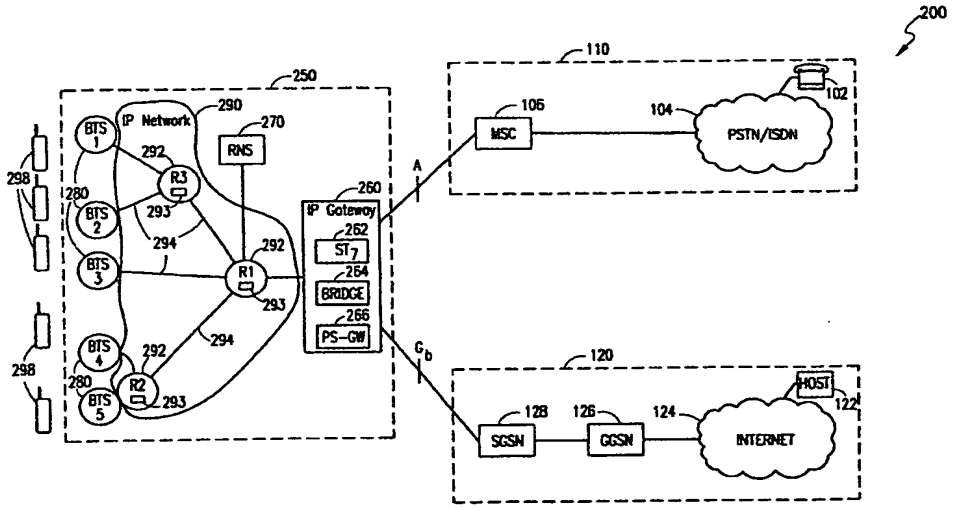
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: APPARATUS AND METHOD FOR DISTRIBUTING A SIGNAL TO SEVERAL BASE TRANSCEIVER STATIONS



(57) Abstract: A telecommunications system (200), base station system (250) and method are provided that are capable of effectively distributing a multicast signal to at least one of a plurality of base transceiver stations (280). More specifically, the base station system (250) includes a plurality of base transceiver stations (280), a radio network server (270), an Internet Protocol gateway (260), and Internet Protocol network (290). The Internet Protocol network (290) includes a plurality of routers (292) which are capable of utilizing a multicast address within a signal to direct the call towards one of the base transceiver stations (280) and is also capable of utilizing the multicast address within the signal to make and direct a copy of the signal towards another one of the base transceiver stations (280).

WO 01/58085 A1

APPARATUS AND METHOD FOR DISTRIBUTING A SIGNAL TO SEVERAL BASE TRANSCEIVER STATIONS

CROSS REFERENCE TO RELATED APPLICATION

This patent application is related to U.S. Patent Application entitled "Base Station System Architecture" (Attorney's Docket No. 34648-00431 USPT), which was filed on January 31, 2000 and is hereby incorporated by reference herein.

BACKGROUND OF THE INVENTION

Technical Field of the Invention

The present invention generally relates to the wireless telecommunications field and, in particular, to an apparatus and method capable of distributing a multicast signal to at least two of a plurality of base transceiver stations.

Description of Related Art

In the wireless telecommunications field, one of the most significant design challenges involves the development of a new base station system (BSS) that can improve how a signal is distributed to several base transceiver stations (BTSs). There are several situations where the same signal would need to be distributed to multiple BTSs. These situations can include, for example, a group call, a soft handover, a hard handover or message distribution.

A drawback of the traditional BSS is that a large load is placed on a single base station controller (BSC) to send the same signal in parallel over dedicated transmission links to multiple BTSs. Moreover, the transmission load on the dedicated transmission links can be more problematic than the load on the BSC. An example of the traditional BSS incorporated within a telecommunications system is briefly discussed below with respect to FIGURE 1.

Referring to FIGURE 1, there is illustrated a block diagram of a traditional telecommunications system 100 incorporating a traditional BSS 150. The general architecture of the traditional telecommunications system 100 is well known and

includes a circuit switched network 110, a packet switched network 120 and a traditional BSS 150.

The circuit switched network 110 includes at least one land-based terminal 102 (only one shown) which can initiate or receive a circuit switched call that is transmitted from or to the traditional BSS 150 through a Public Switch Telephone Network/Integrated Services Digital Network (PSTN/ISDN) network 104 and a mobile switching center (MSC) 106 via an open interface, the A-interface. The circuit switched network 110 also includes the PSTN/ISPN network 104 and the MSC 106.

The packet switched network 120 includes at least one Internet host 122 (only one shown) which can initiate or receive packet switched data that is transmitted from or to the traditional BSS 150 through an Internet network 124, a gateway GPRS support node (GGSN) 126 and a serving general packet radio service support node (SGSN) 128 via another open interface, the Gb interface. The packet switched network 120 also includes the Internet network 124, the GGSN 126 and the SGSN 128.

The traditional BSS 150 when configured according to the Global System for Mobile Communication (GSM) standard contains two types of logical nodes, the base station controller (BSC) 152 and the BTS 154 (only three shown). The BSC 152 operates to manage the BTSs 154 which communicate with mobile terminals 156 via a radio interface. In addition, the BSC 152 can function as a central downlink distributor to distribute a signal to several BTSs 154, and can also function as an uplink bridge to distribute a signal to the circuit switched network 110 and/or packet switched network 120. The BTSs 154 are located at different positions within the coverage area of the traditional BSS 150, and each BTS 154 uses a dedicated transmission link 158 to connect to the BSC 152. These dedicated transmission links 158 can have different lengths depending on the positions of the BTSs 154 with respect to the position of the BSC 152. The use of dedicated transmission links 158 can be problematic due to the large load placed on them and the large load placed on the BSC 152 to distribute the same signal over multiple transmission links 158 to multiple BTSs 154. Therefore, there is a need for a new type of BSS and method that addresses the aforementioned distribution and loading problems associated with the traditional BSS.

BRIEF DESCRIPTION OF THE INVENTION

The present invention addresses the deficiencies of the prior art by introducing an Internet Protocol (IP) network into the architecture of a BSS which enables a more effective way to distribute a signal to several BTSs. More specifically, the BSS of the present invention incorporates an IP network that includes a plurality of routers which are capable of utilizing a multicast address within a signal to direct that signal towards one of the BTSs, and are also capable of utilizing the multicast address within the signal to make and direct copies of the signal towards other BTSs. In other words, the routers are responsible for performing the distribution function that used to be performed solely by the traditional BSC.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the method and apparatus of the present invention may be had by reference to the following detailed description when taken in conjunction with the accompanying drawings wherein:

FIGURE 1, prior art, is a block diagram illustrating a traditional telecommunications system incorporating a traditional base station system;

FIGURE 2 is a block diagram illustrating a telecommunications system incorporating a base station system of the present invention;

FIGURE 3 is a flowchart illustrating the basic steps of a preferred method of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to the Drawings, wherein like numerals represent like parts throughout FIGURES 2-3, there are disclosed an exemplary telecommunications system 200, an exemplary BSS 250 and a preferred method 300 in accordance with the present invention.

Although the BSS 250 is described with reference to a telecommunications system 200 configured according to the GSM standard, it should be understood that the BSS 250 can be incorporated within any type of telecommunications system.

Accordingly, the telecommunications system 200, the BSS 250 and the preferred method 300 described should not be construed in a limited manner.

Referring to FIGURE 2, there is a block diagram illustrating a telecommunications system 200 incorporating a BSS 250 of the present invention. Certain details associated with the telecommunications system 200 are known in the industry and as such need not be described herein. Therefore, for clarity, the description provided below in relation to the telecommunications system 200 omits some components not necessary to understand the invention.

The telecommunications system 200 can include a circuit switched network 110, a packet switched network 120 and a BSS 250. The circuit switched network 110 includes at least one land-based terminal 102 (only one shown) which can initiate or receive a circuit switched call that is transmitted from or to the BSS 250 through a PSTN/ISDN network 104 and a mobile switching center (MSC) 106 via an open interface, the A-interface.

The packet switched network 120 includes at least one Internet host 122 (only one shown) which can initiate or receive packet switched data that is transmitted from or to the BSS 250 through an Internet network 124, a gateway GPRS support node (GGSN) 126 and a serving general packet radio service support node (SGSN) 128 via another open interface, the Gb interface.

The BSS 250 includes an IP gateway 260, a radio network server (RNS) 270 and multiple BTSs 280 all of which are coupled to an IP network 290. This configuration of the BSS 250 is hereinafter referred as an IP based BSS 250. The IP gateway 260 (e.g., interface unit) includes a signaling terminal #7 (ST7) 262 used to convert between the IP based transmissions used within the IP network 290 and the circuit switched transmissions used within the circuit switched network 110. The IP gateway 260 also includes at least one packet switched gateway (PS-GW) 264 used to convert between the IP based transmissions used with the IP network 290 and the packet switched transmissions used within the packet switched network 120. In addition, the IP gateway 260 includes an uplink bridge 266 that is described in greater detail below.

The RNS 270 manages the IP network 290, the IP gateway 260 and the BTSs 280 to provide telecommunication services to mobile terminals 298 via another interface, the radio air interface. Each mobile terminal 298, which is similar if not the same as mobile terminals 156, can communicate with one or more of the BTSs 280 that are located in different locations throughout the coverage area of the IP based BSS 250.

The IP network 290 includes a plurality of routers 292 (e.g., switches) that are located at different locations throughout the coverage area of the IP based BSS 250. These routers 292 can be connected to one another in virtually any configuration, see FIGURE 2 for an illustrative example. As shown, the routers 292 can be located near the IP gateway 260 and RNS server 270 (see router 1), near the BTSs 280 (see router 2), or at a location somewhere between the BTSs 280 and the IP gateway 260 and RNS server 270 (see router 3). Transmission links 294 are used to connect the routers 292, the BTSs 280, the IP Gateway 260 and the RNS 270 to one another.

1. As described-above in the Description of Related Art Section, a drawback of the traditional BSS 150 is that a large load is placed on the BSC 152 (e.g., central distributing bridge) to send the same signal in parallel over several dedicated transmission links 156 to multiple BTSs 154. In addition, there is a large transmission load placed on the dedicated transmission links 156 which can be more problematic than the load placed on the BSC 152. The IP based BSS 250 of the present invention addresses these drawbacks by effectively using the IP network 290 and its routers 292 to distribute a signal to several BTSs 280. The fact that the routers 292 can be located closer to the BTSs 280 than the traditional BSC 152 is also an advantage of the present invention. Again, there are several situations where the same signal would need to be distributed to several BTSs 280. These situations include, for example, a group call, a soft handover, a hard handover and a message distribution all of which are described in greater detail below after describing how to initialize the IP based BSS 250 to distribute multicast signals.

The IP based BSS 250 of the present invention is capable of supporting an IP protocol which enables a sending source to address several destinations using one

address in a packet address field of a signal (e.g., Multicast transmission or Point-to-Multipoint transmission). The sending source and these multiple destinations can be any of the devices in the telecommunications network 200 including the land-based terminal 202, the Internet host 222, the mobile terminals 298 or the BTSs 280.

Each router 292 is capable of using the single address (e.g., multicast address) in the signal sent from the sending source to direct that signal or a copy of that signal towards the appropriate BTSs 280 and/or IP Gateway 260. In other words, the routers 292 along the way between the sending source and the multiple destinations operate to copy and distribute the signal packets when different destinations are reached over different transmission links 294. To accomplish this, multicast routing tables 293 in each of the routers 292 should be updated to contain all the destinations for a particular group. Preferably, the multicast routing tables 293 should be updated prior to the sending source transmitting the multicast signal because it can be more difficult to update the multicast routing tables 293 during real time.

The multicast routing tables 293 can be updated by using an IP multicasting function which is initiated by sending messages to every multicast group member to inform them that they are going to be members of a specific multicast group. In this case the multicast group members are a group of BTSs 280. These BTSs 280 forward the message to the router 292 (see router 2) in the BTS (for clarity only one router 292 is shown to be connected to the BTS 280). When the router 292 inside the BTS 280 receives this message it sends a Membership Report Message including the multicast address to all its neighboring router(s) 292 which include the new multicast address in their multicast routing tables 293. Additionally, the router 292 forwards the Membership Report Message upstream for doing the corresponding update of routing tables 293 in other routers 292. In this way a multicast group member subscribes on IP messages directed to a specific group.

Thereafter, when the sending source (e.g., land-based terminal 202) wants to send a message to a group of mobile terminals 298 using BTSs 280 (e.g., BTS 1 and BTS 2) it only needs to send one message to the nearest router 292 (e.g., router 1). This router 292 (e.g., router 1) looks in the routing table 293 and forwards the message or a copy of the message to all downstream interfaces and then to the members of the

group. This procedure is repeated in next router 292 (e.g., router 3) and so on until all member routers 292 are reached. These routers 292 (e.g., routers 1 and 3) then deliver the message to its hosts in the BTSs 280 (e.g., BTS 1 and BTS 2). Of course, this scenario assumes that all members of the group are mobile stations 298. It should be understood that a BTS can be member of several multicast groups simultaneously, which indicates that different mobile services requiring groups composed in different ways can be in use simultaneously.

It should be understood that the multicast routing tables 293 can be managed and updated by a separate part of the IP protocol known as, for example, the Internet Group Management Protocol (IGMP). The IGMP is made for networks built according to a tree topology, which fits well for usage in the telecommunications system 200. Details about message layout, element coding, routing table maintenance, etc. can be found in the IGMP specifications of the IP protocol. However, since the IGMP is specified for a tree formed network structure it supports multicast downstream only. Thus, if a mobile terminal 298 desires to send a signal to other mobile terminals 298 then the data stream may be sent to a central point (i.e., bridge 246) and from this point be distributed with multicast to all group members. As such, the central point could be considered the sending source for the multicast data stream.

The particular situation (e.g., group call, soft handover, hard handover or message distribution) in which the multicast signal is to be distributed within the telecommunications system 200 has an effect on how the multicast routing tables 293 are prepared in the routers 292. Each of these situations are described in greater detail as follows:

- When a group call (e.g., conference call) function is desired, then all destinations (e.g., BTSs 280) where the members of the group are expected to be located should be represented in a multicast address in the multicast routing tables 293. Group call means that several mobile stations 298 (for example) can be connected to the same call (see, e.g., the Voice Broadcast Service (VBS) and Voice Group Call Service (VGCS) of the GSM). Of course, members of the group can be distributed over big areas covered by many BTSs 280.

It should be understood that the BTS 280 of the sending source is also member of the group and will receive a copy of IP packets it has sent and relay them back to the sending source (e.g., mobile station) and the other mobile stations in that particular cell. One possibility to handle this circumstance is in the mobile station 298, which always is aware when sending is ongoing or not, and the sending mobile station 298 can drop returned packets.

- When the reason is soft handover, every cluster of cells (e.g., BTSs 280) expected to cover common points in the network are represented by a multicast address in the multicast routing table 293. Soft handover means that a downlink speech signal is distributed to two or more BTSs 280, which all send the speech signal to a particular mobile station 298. This particular mobile station 298 selects the signal that gives the best quality, or combines the signals. Thereafter, all the connected BTSs 280 receive the signal from the particular mobile station 298 and forward the signal uplink. These forwarded signals are combined in a router 292 and/or uplink bridge 264 which selects one of the forwarded signals or combines them before forwarding uplink. Soft handover is commonly used in Code Division Multiple Access (CDMA) systems.

- When the reason is to shorten the break at hard handover, then every neighboring BTS relation is represented in a multicast address within the multicast routing tables 293. Hard handover means that a mobile call is switched from one BTS 280 to another BTS. The new BTS 280 is prepared in advance so it has resources to take care of the call, then the mobile station 298 is ordered to change to the new BTS 280. To do this, the call is disconnected from the first BTS 280 when the new connection is established. Hard handover like this is used in most Public Land Mobile Networks (PLMN) networks of today.

At a hard handover the change of base station must be as fast as possible to minimize the interruption in the call. In the downlink direction, the break is typically minimized by distributing the multicast signal in parallel to both of the BTSs 280. In the uplink direction, the uplink bridge 264 (e.g., fast switch) is used which can be located in either an ordinary switch or in a transcoder at the IP Gateway 260.

- When messages have to be distributed, for example paging or time information messages, then the multicast routing tables 293 are prepared to include all BTSs 280 in the area where the message is to be sent. For instance, timing information sent from a central clock (not shown) in this way can be used for different purposes such as for frequency synchronization of carriers.

There are several advantages for using the IP multicasting function in the IP based BSS 250 of the present invention as compared to the traditional BSS 150. For instance, the uplink and downlink directions are independent when using IP based transmissions. This is not the case in a circuit switched transmission system of the traditional BSS 150 where the same bandwidth is normally allocated in both the uplink and downlink directions. The use of the same bandwidth in both directions means that the particular direction requiring the most bandwidth is dimensioned accordingly and any unused bandwidth in the other direction is not available for other users or applications. Also, during short pauses in a speech call, the bandwidth is kept allocated and is accordingly not used at all.

However, when using IP multicast where the uplink and downlink directions are independent to one another, there is a beneficial transmission gain. First, the multicasting function saves additional bandwidth because it is not necessary to send the same information in parallel on the same link. Secondly, if multicast is not used at message distribution a burst of equal messages have to be sent in serial from the source (see FIGURE 1). This will cause a temporary high load on the links. As the link is used also for other types of messages, these messages have to compete with the message burst, which probably increases the jitter on the link. This is serious when

time critical traffic, for example speech, has to compete with the bursts. Of course, the present invention utilizes the advantageous multicast function to help address this loading problem.

Referring to FIGURE 3, there is a flowchart illustrating the basic steps of a preferred method 300 for distributing a multicast signal to at least one of a plurality of BSSs 280. Beginning at step 302, the IP network 290 and routers 292 are prepared to distribute the signal prior to the sending source actually sending the signal. This preparation includes the updating of the multicast routing tables 293 within the routers 290 to include the addresses for all the different groups that can be used in a group call, soft handover, hard handover and/or message distribution (for example). At step 304, the IP based BSS 250 receives the multicast signal from the sending source. Then at step 306, the IP based BSS 250 converts the received signal to an Internet Protocol based transmission if it is not already an Internet Protocol based transmission. Lastly at step 308, the IP based BSS 250 routes the signal or a copy of the signal towards each BTS 280 (and destination) that was indicated by the multicast signal. How this multicast signal is actually routed was described above with respect to FIGURE 2.

From the foregoing, it can be readily appreciated by those skilled in the art that the present invention addresses the deficiencies of the prior art by providing a base station system and method that uses an IP network and Multicasting function to effectively distribute a call to several base station transceivers.

Although one embodiment of the present invention has been illustrated in the accompanying Drawings and described in the foregoing Detailed Description, it will be understood that the invention is not limited to the embodiment disclosed, but is capable of numerous rearrangements, modifications and substitutions without departing from the spirit of the invention as set forth and defined by the following claims.

WHAT IS CLAIMED IS:

1. A telecommunications system comprising:

a base station system capable of receiving a multicast signal from a sending source, said base station system includes:

a plurality of base transceiver stations;

a server;

an interface unit; and

a packet switched network operatively coupled to said plurality of base transceiver stations, said server and said interface unit, wherein said packet switched network includes a plurality of routers which are capable of using the multicast signal to direct the multicast signal or a copy of the multicast signal towards at least one of the plurality of base transceiver stations.

2. The telecommunications system of Claim 1, wherein the router located on a transmission link between the sending source and one of the at least one base transceiver station is capable of directing the copy of the multicast signal on another transmission link towards another one of the at least one base transceiver station.

3. The telecommunications system of Claim 1, wherein the plurality of routers are positioned at various locations throughout said packet switched network.

4. The telecommunications system of Claim 1, wherein said base station system is an Internet Protocol based Base Station System.

5. The telecommunications system of Claim 1, wherein the multicast signal is an downlink signal.

6. The telecommunications system of Claim 1, wherein the sending source uses the multicast signal to indicate which of the plurality of base transceiver stations are to participate in a group call.

7. The telecommunications system of Claim 1, wherein the sending source uses the multicast signal to indicate which of the plurality of base transceiver stations are to participate in a handover.

8. The telecommunications system of Claim 1, wherein the sending source uses the multicast signal to indicate which of the plurality of base transceiver stations are to participate in distributing a message.

9. A base station system comprising:

a plurality of base transceiver stations;

a radio network server;

an Internet Protocol gateway; and

an Internet Protocol network operatively coupled to said plurality of base transceiver stations, said radio network server and said Internet Protocol gateway, wherein said Internet Protocol network includes a plurality of routers which are capable of utilizing a multicast address within a signal received from a sending source to direct the signal towards one of the plurality of base transceiver stations, and are further capable of utilizing the multicast address within the signal to direct a copy of the signal towards another one of the plurality of base transceiver stations.

10. The base station system of Claim 9, wherein the sending source uses the multicast address in the signal to indicate which of the plurality of base transceiver stations are to participate in a group call.

11. The base station system of Claim 9, wherein the sending source uses the multicast address in the signal to indicate which of the plurality of base transceiver stations are to participate in a handover.

12. The base station system of Claim 9, wherein the sending source uses the multicast address in the signal to indicate which of the plurality of base transceiver stations are to participate in distributing a message.

13. The base station system of Claim 9, wherein each router includes a multicast routing address table that was updated prior to receiving the signal from the sending source.

14. A method for distributing a multicast signal to at least one of a plurality of base transceiver stations, said method comprising the steps of:

preparing an Internet Protocol switched network to distribute the multicast signal to the at least one base transceiver station;

receiving the multicast signal from a sending source;

converting the received multicast signal to an Internet Protocol based transmission if it is not already an Internet Protocol based transmission; and

routing the multicast signal or a copy of the multicast signal towards the at least one base transceiver station.

15. The method of Claim 14, wherein said step of preparing further includes updating multicast routing tables in routers located at various positions within the Internet Protocol network.

16. The method of Claim 14, wherein said step of routing further includes distributing the multicast signal or the copy of the multicast signal towards the at least one base transceiver station that is to participate in a group call.

17. The method of Claim 14, wherein said step of routing further includes distributing the multicast signal or the copy of the multicast signal towards the at least one base transceiver station that is to participate in a handover.

18. The method of Claim 14, wherein said step of routing further includes distributing the multicast signal or the copy of the multicast signal towards the at least one base transceiver station that is to participate in distributing a message.

19. The method of Claim 14, wherein said steps of preparing, receiving, converting and routing are performed within an Internet Protocol based Base Station System.

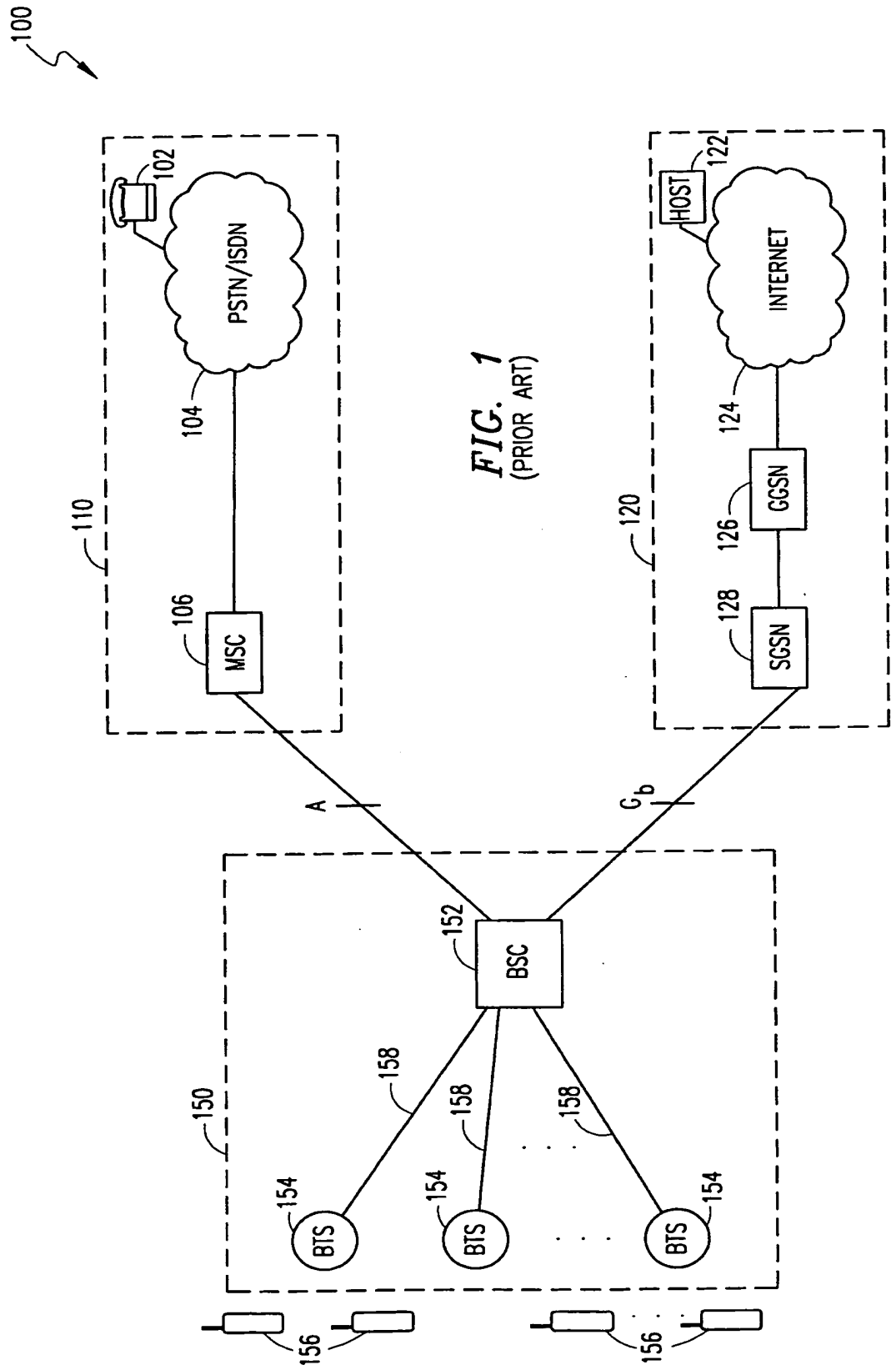


FIG. 1
(PRIOR ART)

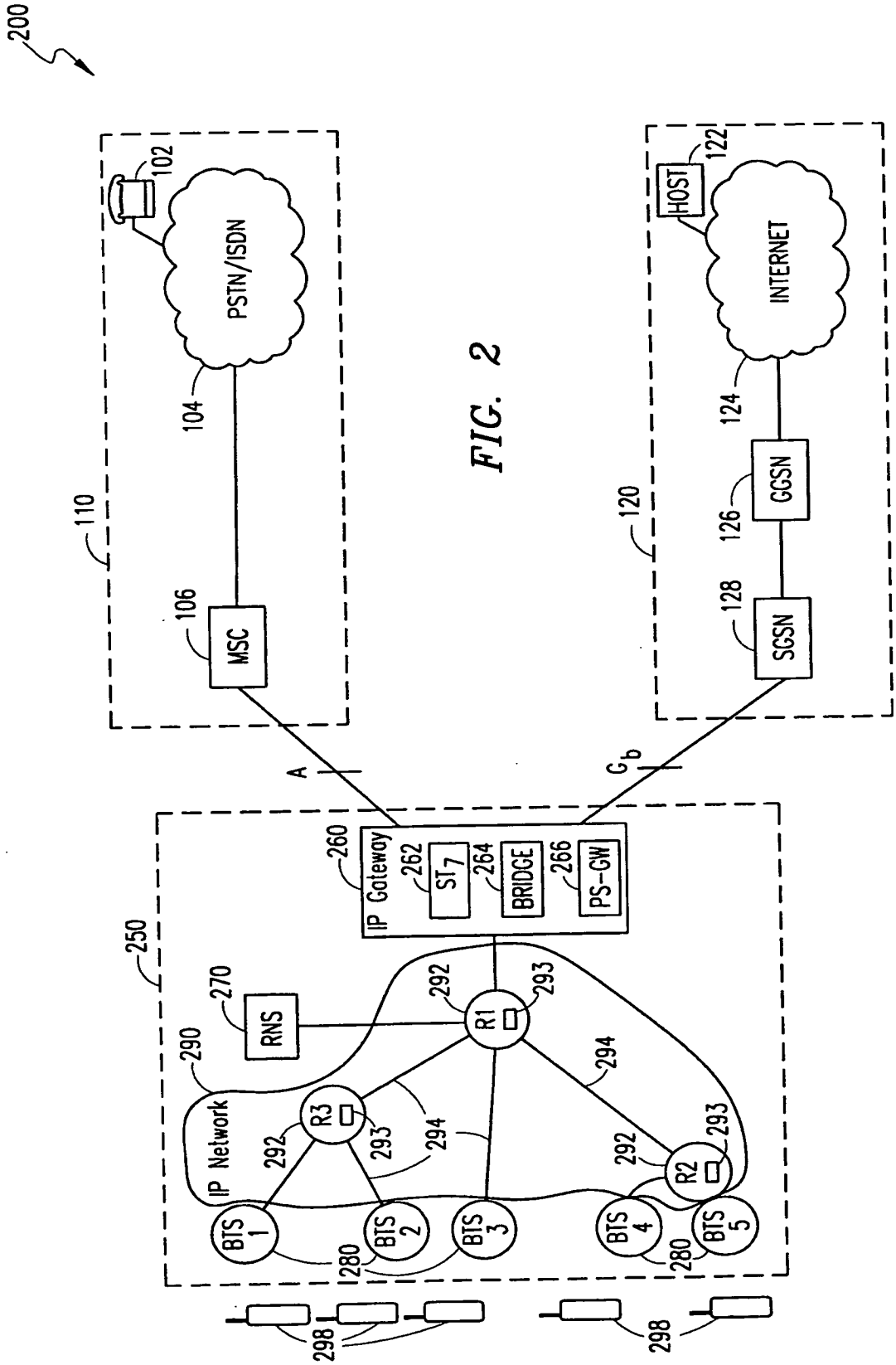

200
110
102
PSTN/ISDN
104
106
MSC
120
122
HOST
INTERNET
124
126
GGSN
128
SGSN
A
Gb
250
260
IP Gateway
262
ST7
264
BRIDGE
266
PS-GW
270
RNS
290
IP Network
292
293
294
R1
R2
R3
BTS 1
BTS 2
BTS 3
BTS 4
BTS 5
280
298

FIG. 2

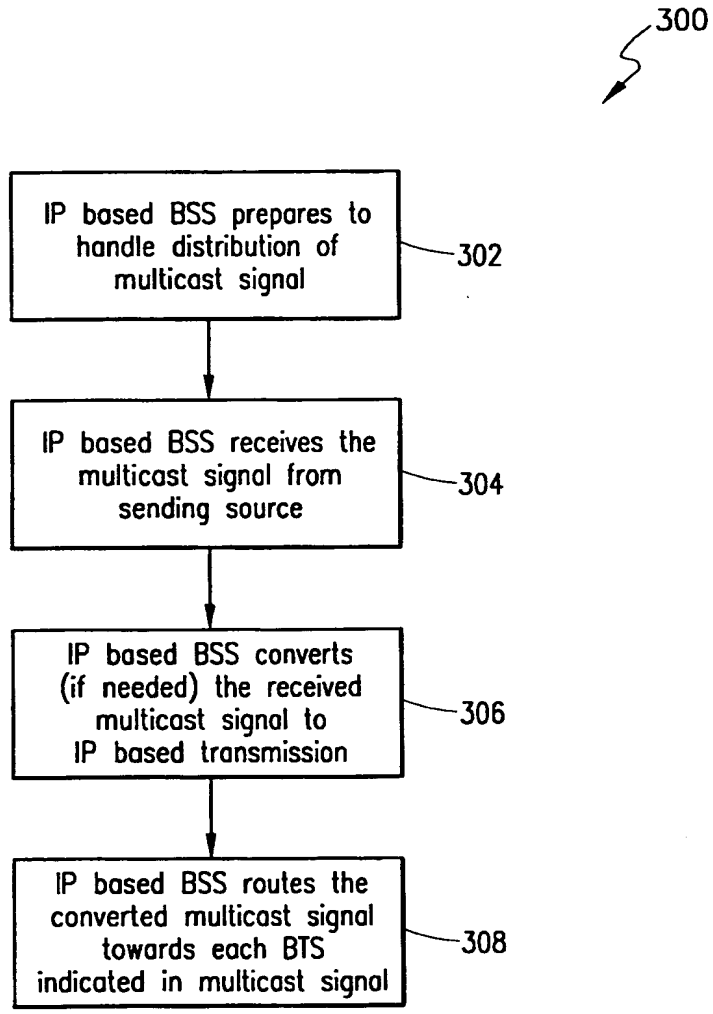

300
IP based BSS prepares to handle distribution of multicast signal
302
IP based BSS receives the multicast signal from sending source
304
IP based BSS converts (if needed) the received multicast signal to IP based transmission
306
IP based BSS routes the converted multicast signal towards each BTS indicated in multicast signal
308

FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/SE 01/00115

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L12/18 H04L12/28 H04Q7/00 H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	ACHARYA A ET AL: "IP MULTICAST EXTENSIONS FOR MOBILE INTERNETWORKING" FIFTEENTH ANNUAL JOINT CONFERENCE OF THE IEEE COMPUTER AND COMMUNICATIONS SOCIETIES. NETWORKING THE NEXT GENERATION. SAN FRANCISCO, MAR. 24 - 28, 1996,LOS ALAMITOS, IEEE COMP. SOC. PRESS,US, vol. CONF. 15, 24 March 1996 (1996-03-24), pages 67-74, XP000622296 ISBN: 0-8186-7293-5 abstract paragraph '0003! - paragraph '0004! --- -/--	1-19

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 April 2001	04/05/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Poggio, F

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/SE 01/00115

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	XYLOMENOS G ET AL: "IP MULTICASTING FOR WIRELESS MOBILE HOSTS" MCLEAN, VA., OCT. 21 - 24, 1996,NEW YORK, IEEE,US, vol. 15TH, 22 October 1996 (1996-10-22), pages 933-937, XP000697406 ISBN: 0-7803-3683-6 abstract the whole document ---	1-8
Y	WO 99 39477 A (ERICSSON TELEFON AB L M) 5 August 1999 (1999-08-05) abstract page 1, line 10 -page 3, line 12 figures 3-9 ---	9-19
A	EP 0 913 965 A (CANON KK) 6 May 1999 (1999-05-06) abstract column 4, line 20 -column 6, line 10 figures 3,6-8 -----	13,15

1

INTERNATIONAL SEARCH REPORT

International Application No
PCT/SE 01/00115

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9939477 A	05-08-1999	AU 2195999 A	16-08-1999
		BR 9907279 A	24-10-2000
		EP 1050135 A	08-11-2000
EP 0913965 A	06-05-1999	FR 2770712 A	07-05-1999
		FR 2770715 A	07-05-1999
		JP 11261599 A	24-09-1999